ONTARIO
FISH AND WILDLIFE
REVIEW

Vol. 1, No. 5 Summer, 1962

ONTARIO

DEPARTMENT OF LANDS AND FORESTS

HON. J.W. SPOONER, MINISTER F.A. MACDOUGALL, DEPUTY MINISTER

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FISH AND WILDLIFE
REVIEW

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THE COVER

Our cover photograph by K. M. Andresen shows a contented angler fishing a likely looking pool on one of the many trout streams in Ontario.

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WITHOUT COMMENT

The good old times are quite gone by, when the veteran sportsman started at break of day to traverse a wild woodland, and returned home contented, carrying in his netted bag hung upon his shot-belt, perhaps a couple of woodcocks and occasionally a rabbit. A hare, except for the use of the kitchen, he would never think of molesting; and if he was himself an eager pursuer of that much persecuted animal with the industrious beagle, to shoot it would have been looked upon almost in the light of a parricidal act, or next in gradation of crime to treason against the state. But though the times are altered, and though an unreasonable outcry may be raised by some against the system of battues, as exciting the rage of competition, and many evil passions, yet it cannot be denied even by its greatest admirers, when we consider the enormous expense that attends giving a real good day's sport in the modern style, that it is a subject of regret, that the enjoyment is confined within so limited a space.

Editorial For Anglers

"The bytynge tyme is erly by the morowe".

From "Treatyse of Fysshynge wyth an Angle".

Dame Juliana Berners, 1496.

CREEL CENSUS--A TOOL OF FISHERIES MANAGEMENT

by C. A. Rettie

Fisheries Management Officer, Parry Sound District

An estimated 1,650,000 people spend a portion of their leisure time each year angling in Ontario waters and, of these, Parry Sound Forest District receives a good share. Many of these sportsmen, who still connect a Conservation Officer's duties solely with law enforcement, are anxious to know the reason behind the line of questioning so often used by the interviewing officer and of the use to which the recorded information is put. The answer to this is "Creel Census" and the following article perhaps will explain at least some of the details.

Good fisheries management practices are based on the results obtained from inventory studies which provide information on the availability and use of the resource. The creel census is one of the principal methods of inventory used in Parry Sound District. Although it is physically impossible to census all sport fisheries in the District, as much information as possible is collected, and these data form the basis for the development of the fisheries program in the area.

Creel census alone is not the answer to all fishery management problems, but it is one of the "tools" used in combination with biological surveys, restocking, lake and stream improvement, tagging and other phases of fisheries work.

A creel census is a canvass of anglers to collect information on their catches and time spent on fishing. Such data include number of anglers, number of hours actually spent angling, number of each species, the size of each fish captured, and the type of bait used. Samples of scales from which age can be determined are collected from as many fish as possible. To be of the greatest value, these records must be continued over a period of several years.

In a creel census study, two techniques have been used:

(1) general census of a representative sample over a large area: and

(2) intensive census covering all or a calculated percentage of all of the fishing on selected waters.

The general census is the method used throughout this District. Every opportunity is taken by our staff to collect data from anglers in the field.

Co-operation of non-departmental people has been solicited so that now, many tourist outfitters, guides, fish and game clubs and individual anglers also keep records of their own and their guests' fishing efforts and regularly turn in their reports for our information. These data, which are collected the year-round, are separated on the basis of summer and winter fishing operations.

Not only successful fishing trips are recorded but also all trips on which nothing was caught. This has been one of the most difficult points to put across to sportsmen, but it is essential if we wish to know the fishing effort expended and the availability of fish.

The greatest weakness of our creel census program is still the lack of information. While we do succeed in obtaining sufficient data from several waters to maintain a year-to-year record of fishing success, the majority of our waters are not sampled at all, or the sample of fishing pressure is so small that it may not present a true picture

A Conservation Officer checks a catch of walleye (or yellow pickerel) at Lake Nipissing. Photo by J.A. Macfie.

in any other respect than the species contained therein.

In general, a creel census will disclose trends in the fishing and in the catch. Study of these records will reveal (dependent on questions answered by anglers) many facts, a few of which are listed below.

1. Annual yield in numbers, kinds, weights and lengths of fishes (This can be expressed in pounds per acre).
2. Distribution and abundance of various species.
3. Intensity of fishing.
4. Catch per hour.
5. Effectiveness of methods and baits.
6. Stocking needs.
7. Maintenance of sustained yield.
8. Proportion of harvest taken by summer fishing as compared to winter fishing.

In reviewing the results of our creel census for the entire District, it is not very difficult to determine that walleye or yellow pickerel and smallmouth bass share top honours as the most sought after and catchable species, followed by lake trout, northern pike, brook or speckled trout, rainbow trout and muskie.

Smallmouth bass and walleye are common in a great many waters, especially along the Georgian Bay shore and northern portions of this District. They have the ability to withstand heavy fishing pressure provided they have suitable spawning conditions. Fishing success for these species in Parry Sound District compares very favourably with any other area in Ontario. Both of these species do have their ups and downs which are apparent over a period of years in our census. These fluctuations can be related back to good or bad conditions at time of spawning for particular year classes, but they are not related directly to fishing pressure.

Fishing for brook, lake and rainbow

Checking creel cards at Harkness Laboratory. Photo by R. Muckleston.

trout takes place principally in the central and eastern portions of the District. Rainbow trout, which are found in relatively few waters, are the direct result of earlier introductions. They have become well established in some waters and are reproducing naturally. Lake trout and brook trout occur naturally in a great many waters. The management of some of these waters includes the planting of hatchery reared fish where the need for restocking is demonstrated. Many of our hatchery fish are marked by clipping a fin or combination of fins for later identification. Through our creel census, we can maintain a check on success or failure of marked plantings and subsequently, in the case of failure, plan further biological studies of the waters in question.

Success in any venture is aided by knowledge, practice and experience. Success in angling is no exception and I believe this holds particularly true with the sport of lake trout fishing. To illustrate this, we have, in our creel census files, reports from one lake of fishing activities of a few enthusiastic lake trout fishermen who, over the length of the season, averaged a catch of one lake trout per 3.5 to 5.6

Based on yearly figures obtained since 1957, the average rate of catch of fish per hour in this Forest District for anglers is as follows:

	Summer	Winter
1957	.3 fish per hour	----------
1958	.3 fish per hour	----------
1959	.4 fish per hour	.2 fish per hour
1960	.5 fish per hour	.15 fish per hour
1961	.3 fish per hour	.12 fish per hour

hours of fishing. These men are known to be summer-long residents on the lake and have probably acquired a good knowledge of the lake trout and its habits. They are not able to catch lake trout on every excursion but the trips on which they are "skunked" are in the minority. On the other hand, we have other records from the same lake of anglers who required from 11.2 to 17.0 hours to capture one lake trout and who were unsuccessful in the majority of their trips. These records were maintained and submitted to the Department by tourist operators. Their guests were mainly families on annual vacation who probably fish only during the short period of their vacation and were therefore neither experienced anglers nor familiar with the water.

The assistance of individual anglers or camp operators in maintaining creel census records is of paramount importance. Without their co-operation, many of our existing records would be less complete. The value of this assistance is well demonstrated in the recording of creel census information for Parry Sound of Georgian Bay where a watchful eye has been kept on the lake trout fishery over the past three years. This area is one of the last strongholds of this species in the entire Georgian Bay and here, too, they seemed doomed to extinction because of the inroads of the sea lamprey. Lake trout anglers in this area are few because of the poor success. Fishing is so sporadic and scattered that, without the co-operation of individual anglers, little or no creel census data could have been obtained. It would now seem that lake trout in this area have declined to such an extent that they no longer attract fishermen. However, some lake trout still remain as was evidenced by their appearance on the spawning grounds last fall and, with the expected control of the sea lamprey, they may yet play a big part in re-establishing the fishery in this area through natural reproduction. By means of the creel census, we have been able to measure the decline of the lake trout fishery and, by similar methods, we will also be able to measure its recovery.

Muskellunge are not widely distributed in Parry Sound District. The main fisheries for this species are in the French River area and Moon River area of Georgian Bay. The result of creel census conducted in the latter area indicates that most fishing for this species is carried out in September and October. This provides considerable revenue to the local outfitters and guides during the slack season between summer fishing and fall hunting. Even with experienced guides, the average number of hours required to capture one muskie was 42.7 in 1960. This is a lot of fishing and requires a great deal of patience on the part of the angler, but it is worthwhile because of the size of the trophy fish that may be taken. Weight range of the muskies taken in this area runs from 6 lbs. 13 oz. to 43 lbs., with an average weight of 19.4 lbs.

While the table of fishing success may at first appear to be a low catch rate, it must be remembered that this table was compiled from the overall creel census and includes the total records of all anglers, experienced and inexperienced, from all waters, both productive and non-productive, during the entire period.

Many individual waters surpass the rate of catch shown and, generally speaking, Parry Sound Forest District enjoys the reputation of being a good producer of fish. We sincerely hope that through the continued co-operation of sportsmen we will be able to maintain or improve our present good rating.

THE MANAGEMENT OF WOODLOTS AND PLANTATIONS FOR WILDLIFE PRODUCTION

by J. B. Dawson

District Biologist, Kemptville District

Owners and managers of woodlots are showing growing interest in managing forested areas for both timber and wildlife values. Many foresters with the Department of Lands and Forests are trying to give wildlife populations a "boost" on county forest areas which are managed by the Department under agreements drawn up with various municipalities. Woodlot owners throughout southern Ontario are also interested in producing more wildlife and they are requesting advice as to management techniques which may be applied.

A good woodlot or plantation is a valuable property and well worth managing properly. At the outset, we should stress that many of the specific techniques used to attract wildlife will enhance, rather than detract from, timber values. Similarly, good forestry practices are in general good for wildlife.

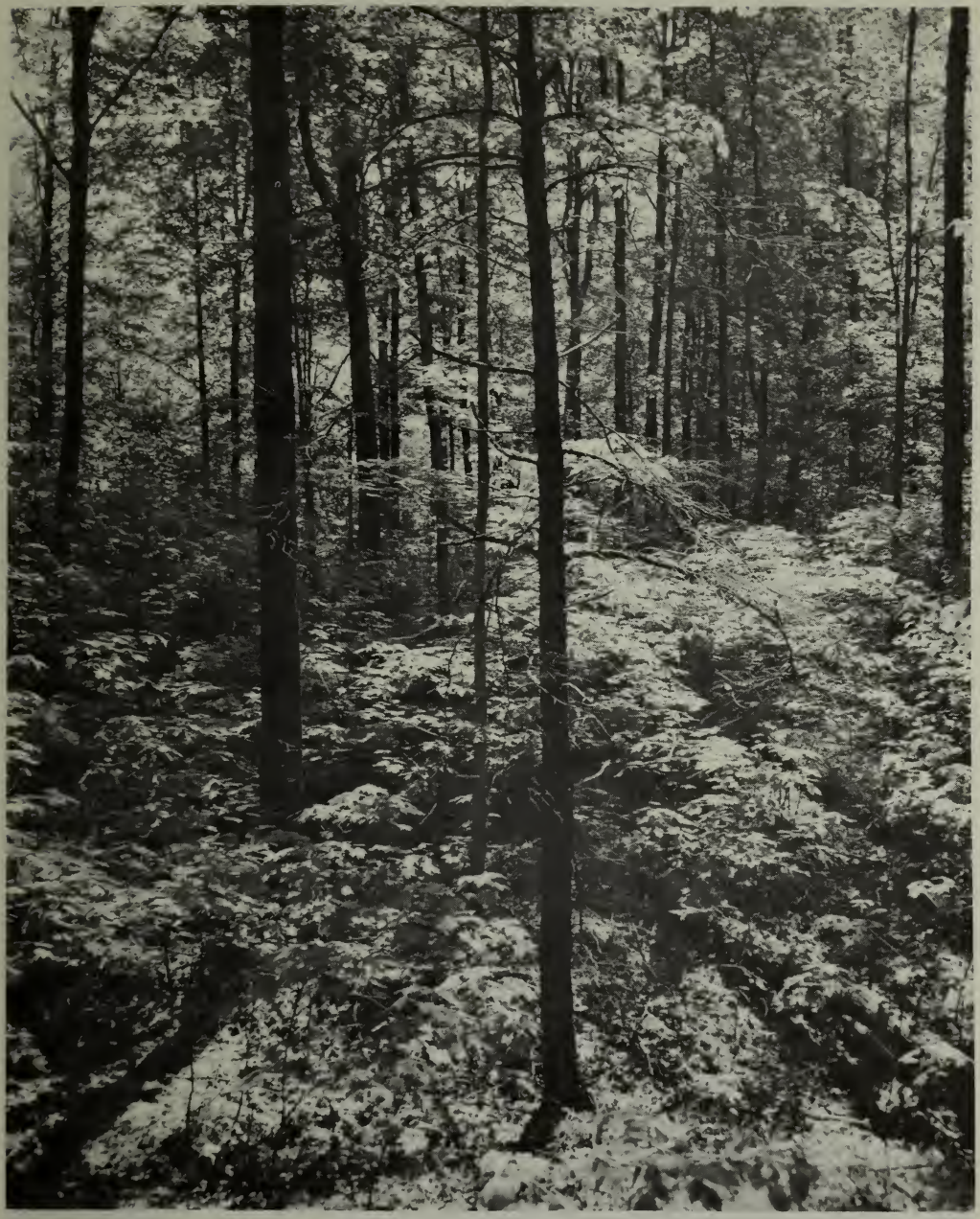
Because wildlife is influenced greatly by "edge effect", the degree of interspersion or mixing of habitat types governs to a large extent the use made of an area by wildlife. The importance of edge effect can be shown with the following illustration. A city may furnish all the needs required of humans; if, however, all the kitchens are situated in one quarter of the city, all the bedrooms in another, and all the dining rooms and restaurants in another, then the human population the city can support will be considerably reduced. So it is with game. For instance, if a ruffed grouse requires four principal environmental types including, for example, openings for feeding and and conifer stands for roosting, then a square mile made up of 25 per cent of each of the four types would be optimum range. If each 25 per cent lay in a single block, then the area might support only one grouse brood, located where the four cover types came together. If the square mile had a good mixing of types, however, then it might support may broods instead of one.

The amount of game which a habitat will support depends on the mobility of game species and the mixing of the proper environmental types required by the mammals or birds in question. Thus, pure, even-aged stands over large areas are undesirable, and efforts should be made, as far as practicable, to vary the tree species composition throughout woodlots and plantations.

The following discussion will deal with both woodlots and plantations. The former are considered to be natural mixed woodland; the later are planted stands with coniferous species predominate.

Woodlots which have a variety of tree species of all ages lend themselves to long-term forestry management since small crops can be taken at short intervals; this is also good management for wildlife. The greater the variety of trees, shrubs and vines in various stages of growth, the greater the value of the woodlot to wildlife.

Extensive clear cutting is not recommended, and a sustained-yield type of harvest, where scattered spot cuttings of mature trees are carried out, either singly or in groups, is good forest and game management. Cuttings, which open the forest canopy and let sunlight through, stimulate growth of



A woodlot of trees of varying ages and with a good under-story of small trees and shrubs -- desirable for both forestry and wildlife. Photo by G. Brown.

brambles and other ground cover which prove attractive to many game species.

Another method is to clear-cut small blocks or long narrow strips in a rotation so that the woodlot is divided into a comparatively large number of units. In this way, a good mixture of various ages will occur in the stand.

Roads throughout large stands are important in creating "interspersion"

or mixing of types. Roads and trails are useful in allowing access to hunting and they also benefit game. Openings created by roads are especially attractive to grouse, and it is not a coincidence that walking the bush roads and trails produces good grouse hunting.

Extensive stands of pure hardwoods may be improved by underplanting them with clumps of shade-tolerant conifers such as white or black spruce, hemlock and balsam. Girdling or cutting the broad-leafed species in and around these clumps often ensures better conifer survival and growth.

The edges of the woodlot are very important as game habitat; fences located a few yards from the woodlot edge encourage shrub growth which is valuable wildlife habitat. A better and easier method of producing this brushy "edge" is to cut back the woodlot 20 or 30 feet. With this method, new fencelines are not required and cuttings can be used to make brushpiles which are used by many species of wildlife.

Special techniques sometimes may be applied to increase hunting opportunities. Greenery, and especially clovers, are a preferred autumn food of grouse; this has prompted the Maine Department of Inland Fisheries and Game to plant, experimentally, logging roads in northern Maine with alsike and ladino clovers. This technique of attracting grouse appears to have merit in northern regions; in southern agricultural areas, this method may be useful but probably should be restricted to the larger tracts of woodland.

The protection of a woodlot from fire and from grazing cattle is very important. Fire protection speaks for itself, but many woodlot owners do not appreciate the damage to forestry and wildlife values alike caused by livestock. Fencing is a *must* if wildlife is to be encouraged.

Hollow trees and stubs are valuable as homes for wildlife and some of these

A mixture of cover types. Note the natural reproduction of maple on light sand in foreground. Right: reforested land, showing an excellent mixture of conifers, broad-leaved trees and forest openings. As the trees mature, this habitat will provide even more valuable cover for wildlife. Photos by R. Muckleston.

should be left standing, or the hollow logs left lying on the ground. Squirrels, raccoons, wood ducks, screech owls and many other birds use the hollow trees and stubs, while rabbits and some fur-bearers use the hollow logs.

Piles of brush make excellent cover for cottontail rabbits; prunings can be used to good effect and can be placed over an old stump or log. These piles should be at least eight to ten feet across, and about six feet in height.

Brushy, vine-covered hedgerows are important as escape cover and as travel lanes for wildlife. In agricultural southern Ontario, wild grapes, haws and wild apples are often found in hedgerows located on or near woodlot edges. These attract many types of wildlife.

Wetland produces more game per acre than any other type of habitat. Where ponds, marshes or streams are associated with woodland, better wildlife returns can be expected. Often semi-permanent or very shallow wetlands can be improved by blasting or by the construction of small, inexpensive dams or dikes.

Beavers may dam water courses and damage timber stands, but wildlife usually benefits to a marked degree. A woodlot owner who has uninvited beaver "tenants" may find it more convenient (and less nerve-racking) to shut his eyes to timber losses and enjoy the increased wildlife production. The task of discouraging the efforts of the invariably persistent beaver is frequently rather frustrating.

Wildlife management on areas which have been reforested, usually to coniferous tree species, is a rather different problem and one which merits special mention here. Management of most large reforested areas in Ontario is planned by professional foresters with the Department of Lands and Forests, and this group may be best able to put the following suggestions to work.

Small trees, along with abundant ground cover, are produced when the forest canopy is opened by removing mature trees. Photo by J.B. Dawson.

Managing plantations for both timber and wildlife can be done with very little trouble or loss in timber values. One of the main problems, however, is the fact that a forester's idea of a good-looking plantation often differs greatly from that of a wildlife manager's. Straight, neat, dense, uncluttered stands may be the forester's ideal but they are poor producers of wildlife. The plantation which is cut up into smaller areas and which has blocks of variable ages and species – and which looks almost natural – is much better wildlife habitat.

Large, even-aged stands of conifers tend to be "biological deserts" and efforts should be made as far as practicable to vary the species and age composition of plantations. Actually, a little carelessness goes a long way toward producing better wildlife habitat. Small areas of wet or shallow soils or dense brush should not be planted and, where mortality occurs over very small areas, these too can be left.

Old orchards should not be disturbed, and a few apple trees in a small clearing, surrounded by coniferous cover, will be heavily used by both grouse and deer. In older plantations, species such as apple, hawthorn or cherry should be released from conifer competition.

Hedgerows are important to wildlife and should be left intact; a strip of unplanted land should be left beside these hedgerows.

Wetland areas should not be planted right to their margins, and a buffer strip of either brush or grass should be maintained around the edges. In southwestern Ontario, some ponds may produce several Mallard broods if a grassy strip is maintained around the wetland.

In summary, the following suggestions may prove helpful.

(1) The size of a plantation should be restricted to a diameter of 600 feet as a rule of thumb. The shape of the plantation determines to a large extent the amount of "edge" produced; a checkerboard effect of plantations and adjoining brushy land is most desirable.

(2) Make the plantation variable with an admixture of various species of different ages. Leave orchards, wet areas, dense brush patches and shallow soils unplanted.

(3) Leave a strip of unplanted land beside hedgerows.

(4) Maintain small openings throughout the plantation. Thinnings encourage herbaceous and hardwood undergrowth which are required by many wildlife species. Prunings or thinnings can be piled, making excellent cottontail rabbit cover.

(5) Wetlands should be improved as wildlife habitat or, if this is not possible, left undisturbed.

(6) Roads, foot paths and fireguards are important in allowing access to hunters.

From a multiple-use point of view, many plantations could be greatly improved by taking some of the "spit and polish" from planting and subsequent care of the crop. What really is needed are plantations which look less like row crops or manicured orchards and more like really natural woodlands.

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SPARE THEIR LIVES!

by Barbara Froom
Operations Branch

Through the ages, human beings have had an aversion to certain kinds of wildlife. Unfortunately, reptiles and amphibians, although among the world's most fascinating creatures, have been the most persecuted and feared. Snakes, in particular, have been despised and wantonly killed due to unreasoning prejudice and ignorance of their true nature. Very few of the numerous species of snakes in the world are poisonous. Even fewer are capable of inflicting a fatal bite. Studies in the United States have proved that stinging insects cause more disability and deaths than venomous snakes.

In Canada, it is fortunate that the only venomous species, the rattlesnakes, are easily identified. The Pacific rattlesnake is found in some parts of British Columbia, the prairie rattlesnake in Alberta and Saskatchewan, and the small massasauga in Ontario. There are no native, venomous snakes in Quebec and the Maritimes, and Newfoundland hasn't any native snakes at all.

The fox snake, quite harmless but often mistaken for a rattlesnake because of its mottled appearance and the habit of vibrating its tail when frightened.

It is surprising, the number of people that insist that we have native copperheads and water moccasins. Our harmless fox and milk snakes are the ones most commonly mistaken for copperheads. Snakes do not travel far, and copperheads are too far from the Canadian border to stray into our country. The common, heavy-bodied water snake is mistaken for the venomous, southern water moccasin which could not possibly endure our cold climate.

The massasauga is short and stout, seldom attaining a length of more than two and a half feet. The body is grey or brownish with a series of dark, mottled blotches down the back. Unlike harmless snakes, it has a vertically elliptical eye pupil and pits between the eye and nostril. It is a mild-tempered snake which prefers retreat to attack. In Ontario, it is found chiefly on the Bruce Peninsula and along Lake Erie and Lake Huron shores and the shores of Georgian Bay.

The larger, timber rattler that at one time was quite common in the Niagara Gorge, is now believed to be extinct in Ontario. The last, officially recorded specimen was captured at the Gorge in 1941.

The bite of the Massasauga can be fatal and there was a death from this reptile in 1956. This snake was picked up and handled through misidentifica-

tion. Fortunately, antivenin is now available in key Ontario centres in the rattler area. When it is administered within reasonable time after the bite, there are generally no serious complications. It is easy to tell if one has been bitten by a rattler as the bitten area swells, usually instantaneously.

Some non-venomous snakes will bite if molested. However, in most cases, the penetration is not deep and only an antiseptic solution to prevent possible infection is necessary. It is not necessary for snakes, including rattlers, to coil and strike in order to bite. If stepped on or handled, they may simply twist their head and bite.

The water snake, capable of a rather vicious bite, attains a length of four feet and occasionally a little more. Its general colour is brown with darker cross-bands on the forward quarter of the body. When submerged, adults sometimes appear almost a uniform black. It is not adverse to eating dead and diseased fish; thus, in a small way, it helps to keep pollution from our waters.

The hog-nosed snake, often called a "puff adder", is the actor of the snake kingdom. This stout, mottled snake will hiss, puff and even strike—but always with the mouth closed. As a last resort, it will roll over and "play dead", mouth agape. It has well-developed rear, fang-like teeth for deflating toads, its chief food. Practically the only possibility of a bite would be in hand-feeding a captive specimen.

The thick-bodied hog-nosed snake is a comical fellow. He will hiss, puff, strike (with his mouth closed) and even "play dead"

Economically, reptiles and amhibians are beneficial. Snakes are among the most effective natural enemies of the rodent family. Unlike other predators, they can make their way into narrow holes and trap rodents in their subterranean homes. Large rodent-eating snakes, such as the fox snake, milk snake and Canada's largest snake, the black rat or pilot black snake, are of untold benefit to the farmer, saving his valuable crops from the ravages of rodent pests. Unfortunately, all too often it is the farmer himself who kills these snakes. In this way, the large species are less fortunate than their tiny relatives that are able to escape notice. "Because a snake is 'enormous', it must be dangerous", is a common belief. Sometimes, the mottled fox snake and even the milk snake with its brownish, saddle-shaped markings, are mistaken for rattlers by inexperienced persons. But the black rat snake, because of its size alone, has been wantonly destroyed and is now rare in Ontario. It is found chiefly along the north shore of Lake Erie and in Frontenac and Leeds counties in the east.

The common garter snake with its striped appearance is easily identified even by the most inexperienced person. In the Long Point area, melanistic (all black) garter snakes are quite common.

A captive massasauga in a relaxed position. Note the stoutness of its body in proportion to its 20 inch length. Photo by W. Masters.

Small snakes, such as the little, brownish DeKay snake, red-bellied snake and the beautiful, smooth, green snake, are also beneficial as they feed chiefly on insects, slugs and various kinds of worms which damage our vegetable and flower gardens and even forest trees.

Other reptiles, such as lizards and turtles, are not as universally disliked as are snakes, but the snapping turtle is often the target of much unjust criticism. It is accused of devouring waterfowl in great numbers. Actually, the snapper is a good scavenger and, like the water snake, feeds frequently on dead and decaying fish and other animal matter. Pet turtles are also victims of man's ignorance. Seldom do they receive sufficient warmth, water deep enough for swimming or a well-balanced diet of raw fish, meat, snails, earthworms and greens.

The amphibians—frogs, toads and salamanders (the mudpuppy is a completely aquatic salamander)—like small snakes, are also beneficial as they feed almost entirely on insects, slugs and worms. Although not wantonly killed to the same extent as snakes, they too suffer through the activities of man. Frogs are often used in excess for fishing. Those not used are frequently left to die a miserable death in a container rather than being humanely released. Also, because of population increase and industrial expansion, the natural habitat, so necessary for the survival of these creatures, is rapidly being depleted and polluted.

The motto of the Canadian Amphibian and the Reptile Conservation Society is an excellent one, "Let Them Live!" If people would do just this, they would reap the many benefits of these creatures for years to come.

IMPOUNDMENTS IN ONTARIO

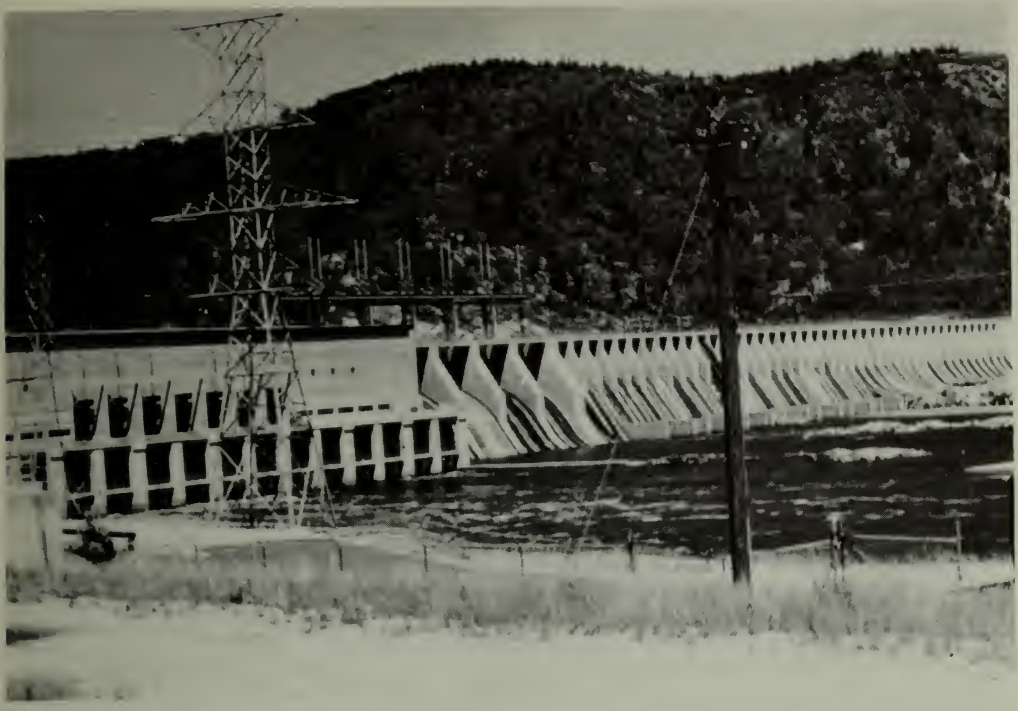
Ontario's abundant lakes, rivers and streams have always been numbered amongst the most treasured assets of the province. Long before the coming of the white man, these waterways served as travel routes for the wanderings of Indian bands and they provided an abundance of fish for refilling larders which might otherwise have become disastrously empty in times of drought or game scarcity. In the centuries which followed, these same waterways served in turn as routes for exploring and mapping the vast new land, as travelways for the voyageurs who expanded the lucrative fur trade into the remotest corners of the wilderness, and for the vanguard of settlement which pushed beyond the end of the slow-growing network of roads.

Man first started to tamper with the free flow of rivers and streams in Ontario when he required a source of power for grinding his grain and for sawing lumber for the frame houses and barns which replaced the original log structures. Harnessing the power of fast-flowing water became a matter of building a dam which concentrated the drop of a few hundred feet or a few miles of stream bed at one location. The free fall of water over this drop drove his water wheels or turbines with sufficient force to serve his purposes. Loggers soon found that dammed up waters could be released to flush logs down a stream whose normal flow was not sufficient to transport these materials to mill and market. Before the end of the nineteenth century, impounded water was being used to drive turbines which generated hydro-electric power, and Ontario, with its abundance of water, began growing into the industrial giant among Canada's provinces.

Industrialization, population growth in urban centres, and reduction of working hours have led to increased need and desire for recreation in natural surroundings. To the multi-million dollar industrial value of Ontario's waters have been added a multi-million dollar tourist industry and a recreational value of inestimable worth.

Ontario now has hundreds of impoundments of varying sizes being used for such purposes as generation of hydro-electric power, flood control, log driving and the maintenance of water levels in canals and shipping routes. What effect do these impoundments have on the fish and wildlife and on the recreational value of the waterways which they affect?

There is some danger in generalizing about impoundments which are of different size and which have been constructed to serve different purposes. In fact, each impoundment provides its own special set of circumstances which may differ in some respect from every other impoundment. There are, however, some common features, chief of which is the fact that every impoundment is designed to control the flow of water so as to make stream flow more uniform throughout the seasons of the year than it would ordinarily be in the natural state. This means an artificially high level at some seasons of the year and greater or lesser drawdowns during the dry periods when natural stream flow must be supplemented by the use of stored water. Impoundments invariably involve a dam which, without



The Otto Holden Dam on the Ottawa River. The power generating station may be seen on the left. Photo by J.M. Fraser.

modification, forms a barrier to upstream movements of a fish.

Fortunately, most of Ontario's native species of fish are not particularly migratory in their habits and thus are not usually affected seriously by damming of water courses. Even the pickerel, which likes to travel upstream to gravelly spawning beds in fast-flowing water, is not often cut off from suitable spawning areas. Similarly, it is only rarely that speckled trout spawning runs have been interfered with by impoundment dams. Early dams on such rivers as the Moira and the Salmon may have contributed to the loss of Lake Ontario's population of Atlantic salmon but not before agricultural practices had caused siltation and increasing water temperatures which had already spelled the doom of this species.

Introduction of the rainbow trout into Ontario waters had provided us with the one species which depends for its reproduction on long upstream migrations and is, therefore, vulnerable to the effects of damming water courses. Some effort is now being made to determine the locations where dams are having an adverse effect on this species, and fish-ways are being tested as a means of alleviating these effects.

Most lake-spawning species appear to reproduce satisfactorily in impoundments. Only rarely are spring drawdowns rapid or violent enough to expose the eggs of spring spawners. Fall spawners, such as the lake trout or whitefish, may, in some circumstances, be more seriously affected. Normally, impoundments are subject to a more or less continuous drawdown throughout the winter to supplement normally low stream flow during this

Rocky Island Lake, created by damming the Mississagi River, provides excellent angling for pike. Photo by J.M. Fraser.

period of the year and also to get rid of excess water to provide maximum storage facilities for the spring freshet.

Martin (1955) studied the effect of winter drawdown on lake trout spawn in a number of Algonquin Park impoundments. He found it difficult to generalize about these effects because of the differences from lake to lake and from year to year in the amount of winter drawdown and the variety of depths at which lake trout spawn. His further investigation of twelve lakes in Algonquin Park has shown (personal communication) that the small drawdowns involved were not seriously harmful to lake trout reproduction. There are, however, some examples of larger drawdowns which have had detrimental effects. For example, in one large northern Ontario lake, which has a winter drawdown of from seven to ten feet, it has been estimated that approximately twenty-five per cent of the lake trout eggs are lost annually. In another large storage lake, which is subjected to a fourteen-foot drawdown, the lake trout population has been eliminated.

Impoundments have a wide range of effects on the physical and chemical environment for fish. Where impoundment facilities are incorporated into an existing lake, the environmental changes and effects on the fish population are slight or negligible. However, a man-made lake on a flowing water course will ordinarily bring about great changes in water temperature, oxygen content, turbidity and siltation, often resulting in a significant change in the

Belwood Lake, above Shand Dam on the Grand River. Its primary purpose was flood control but it offers recreational opportunities, too. Photo by O.E. Devitt.

kind of fish present in the water and in the relative abundance of each. Sometimes, the effect is to produce a considerable increase in angling opportunity.

Extreme cases of slowing water movement can have detrimental effects such as those studied by Millest and Irizawa (1955) at the Otto Holden Dam on the Ottawa River. Considerable fish mortality occurred during a period of extremely hot weather when completely impounded water was subject to excessive warming and a reduction in oxygen content. To make matters worse, the decomposing waste from an upstream pulp mill further reduced the oxygen supply. In this extreme case, the environmental conditions produced were so bad that when the dam was opened, following a three-day shut off, some fish were killed in the immediate downstream area.

It is apparent that some extreme conditions produced by impoundments are detrimental to angling. However, in general, the results have been beneficial. Fraser (1957) in his report on impoundments in Ontario points out that: "In many impoundments, additional habitat has become available to native fish with a resulting increase in their population. The creation of Rocky Island Lake in 1950 by damming the Mississagi River resulted in an expanded pike population which has become very popular with anglers." The creation of Eugenia Pond by damming the Beaver River has provided additional habitat for the native speckled trout population and,

for the past forty years, production of trout from this impoundment has been greater than the original stream could possibly have supported. Anglers on Lac Seul experience excellent success, fishing around the flooded timbered shoreline of that lake.

The effects of water impoundments on wildlife are as variable as their effects on fish. Numerous small impoundments have developed into excellent waterfowl habitat and have become major producers of ducks. The Luther Marsh, created as a flood control structure on the Grand River, is an excellent example of man-made waterfowl habitat. Many of the larger impoundments have had a relatively neutral effect on waterfowl populations and a few, such as the impoundment of Frederickhouse Lake near Timmins, have had a decidedly detrimental effect. Widely fluctuating water levels have in some cases affected adversely the growth of aquatic plants used as food by ducks and muskrats. Wild rice, a spectacular but relatively unimportant food of ducks, is one of the plants most sensitive to water level fluctuations. Winter drawdowns commonly cause freezing out of muskrats and may seriously limit production of this little fur-bearer.

Other recreational uses of water impoundments are affected to degrees as variable as those for fish and wildlife populations. Scenic values may be as high as those of Lake of the Woods or as low as those of Lac Seul with its shoreline of flooded timber. Navigation may be facilitated by the higher water levels of impoundments or hindered in some cases by bays and channels choked with driftwood. Some impoundments maintain a summer water level which, to the delight of recreation seekers, is more stable than natural levels. In other cases, necessary summer drawdowns detract from general recreational values. In water-hungry southwestern Ontario, flood control impoundments have added tremendously to recreational opportunities, even though such detrimental features as summer drawdowns make for less than ideal summer playground conditions.

Ontario's water impoundments, created to serve a variety of needs under a variety of circumstances, have demonstrated that it is usually possible to fulfill the prime objective and still provide recreational opportunities of high quality. In many cases, groups with conflicting interests have become partners when discussions of each group's requirements have pointed the way to compromise. In a few cases, the dictates of economics will continue to rule in favour of the prime purpose of the impoundment until such time as other methods of producing hydroelectric power or of controlling floods have become feasible.

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A Treatyse of

Fysshynge wyth an Angle

BY

DAME JULIANA BERNERS:

BEING A *FACSIMILE* REPRODUCTION OF THE FIRST BOOK ON THE SUBJECT OF FISHING PRINTED IN ENGLAND BY

WYNKYN DE WORDE

AT WESTMINSTER IN 1496.

With an Introduction by

REV. M. G. WATKINS, M.A.

ELLIOT STOCK, 62, PATERNOSTER ROW,
LONDON, E.C.
1880

"A TREATYSE OF FYSSHYNGE WYTH AN ANGLE"

The facing page is a facsimile reproduction from the first book on fishing, "A Treatyse of Fysshynge wyth an Angle", written by Dame Juliana Berners and published at Westminster in England by Wynkyn de Worde in 1496. In modern typography, it reads as follows.

Ye that can angle and take fysshe to your plesures as this forsayd treatyse techyth and shewyth you: I charge and requyre you in the name of alle noble men that ye fysshe not in noo poore mannes severall water: as his ponde: stewe: or other necessary thynges to kepe fysshe in, without his lycence and good wyll. Nor that ye use not to breke noo mannys gynnys lyenge in theyre weares and in other places due unto theym. Ne to take the fysshe awaye that is taken in theym. For after a fysshe is taken in a mannys gynne yf the gynne be layed in the comyn waters: or elles in suche waters as he hireth, it is his owne propre goodes. And yf ye take it awaye ye robbe hym: whyche is a ryght shamful dede to ony noble man to do, that thevys and brybours done: whyche are punysshed for theyr evyll dedes by the necke and otherwyse whan they maye be aspyed and taken. And also yf ye doo in lyke manere as this treatise shewyth you: ye shal have no nede to take of other mennys: whiles ye shal have ynough of your owne takyng yf ye lyste to labour therfore. Whyche shall be to you a very pleasure to se the fayr bryght shynynge scalyd fysshes dysceyved by your crafty meanes and drawen upon londe. Also that ye breke noo mannes heggys in goynge abowte your dysportes: ne opyn noo mannes gates but that ye shutte theym agoyn. Also ye shall not use this forsayd crafty dysporte for no covetysenes to thencreasynge and sparynge of your money oonly, but pryncypally for your solace and to cause the helthe of your body, and specyally of your soule. For whanne ye purpoos to goo on your disportes in fysshynge ye woll not desyre gretly many persones wyth you, whiche myghte lette you of your game. And thenne ye may serve god devowtly in sayenge affectuously your custumable prayer. And thus doynge ye shall eschewe and voyde many vices, as ydlnes whyche is pryncypall cause to enduce man to many other vyces, as it is right well knowen. Also ye shall not be to ravenous in takyng of your sayd game, as to moche at one tyme: whiche ye maye lyghtly doo yf ye doo in every poynt as this present treatyse shewyth you in every poynt.

MORE MOOSE IN HUNTED PARK

Lake Superior Provincial Park was opened to hunting last fall for the first time and, it is estimated, about eighty moose were shot. Concern about the park moose having been over-shot disappeared as reports from the aerial census were received. Paul Endress, the officer in charge, reports moose more abundant than ever in the park interior; he estimated a total park population of more than five hundred. -- N.D. Patrick, Biologist, Sault Ste. Marie District.

¶ Here folowyth the order made to all thoſe whiche ſhall haue the vnderſtondynge of this foreſayde treatyſe & vſe it for theyr pleaſures.

YE that cary angle & take fyſſhe to your pleſures as this foreſayd treatyſe techyth & ſhewyth you: I charge & requyre you in the name of alle noble men that ye fyſſhe not in noo poore mannes ſeuerall water: as his ponde: ſtewe: or other neceſſary thynges to kepe fyſſhe in wythout his lycence & good wyll. ¶ Nor that ye vſe not to breke noo mannys gynnys lyenge in theyr weares & in other places due vnto theym. Ne to take the fyſſhe awaye that is takey in theym. For after a fyſſhe is takey in a mannys gynne yf the gynne be layed in the comyn waters: or elles in ſuche waters as he hireth: it is his owne proper goodes. And yf ye take it awaye ye robbe hym: whyche is a ryght ſhamfull dede to ony noble man to do / that the ayes & brybours done: whyche are punyſſhed for theyr euyll dedes by the necke & otherwyſe whan they maye be alyed & takey. And alſo yf ye doo in lyke maner as this treatiſe ſhewyth you: ye ſhal haue no nede to take of other meſys: whiles ye ſhal haue ynough of your owne takyng yf ye lyſte to labour therfore. Whyche ſhall be to you a very pleaſure to ſe the fayr bryght ſhynynge ſcalys fyſſhes diſcouered by your crafty meanes and drawey vpon londe. ¶ Alſo that ye breke noo mannys heggys in goynge aboute your diſportes: ne oppy noo mannes gates but that ye ſhytte theym agayn. ¶ Alſo ye ſhall not vſe this foreſayd crafty diſporte for no couetyſenes to themcreaſynge & ſparynge of your money oonly / but pryncypally for your ſolace & to cauſe the helthe of your body. and ſpecyally of your ſoule. For whanne ye purpoos to goo on your diſportes in fyſſhyng ye woll not deſyre gretly many perſones wyth you. whiche myghte lette you of your game. And thenne ye maye ſerue god deuoutly in ſayenge affectuouſly youre cuſtumable prayer. And thus doynge ye ſhall eſchewe & voyde many vices. as ydylnes whyche is prynceypall cauſe to enduce many to many other vyces. as it is ryght well knowey. ¶ Alſo ye ſhall not be to raueno us in takyng of your ſayd game as to moche at one tyme: whyche ye maye lyghtly doo yf ye doo in euery poynt as this preſent treatyſe ſhewyth you in euery poynt. whyche ſholde lyght

Dave Crosby, a man in 1,650,000, shows a freshly caught brown trout which goes into his creel and the records of Conservation Officer Ralph Malloch of Lake Simcoe District who is taking a creel census. Photo by W. Masters. See story by C.A. Rettie, this issue.